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DEVICE FOR SUPPLYING CHEMICAL SOLUTIONS

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The invention relates to a device for supplying chemical solutions, in which at least one channel can be blocked by an adjustment valve with a valve cone, especially for dosing chemical suspensions into pressurized waterlines.

In known devices, chemical suspensions are introduced into the pressurized waterline from a container via the supply channel and/or via a nozzle. The discharge channel for the active pressurized water and the supply channel for the suspension or these nozzles can be blocked individually by an adjustment valve that has a valve cone. Through the penetration of waste particles, such as slurry, sand, rust, and the like, carried along in the active pressurized water from the pressurized waterline into the nozzle or into the small nozzle channel or into the adjustment valve, furthermore through chemical particles entrained by the suspension, one of the nozzles, nozzle channels, and/or adjustment valves very frequently becomes blocked and thus the chemical solution supply is disrupted. Therefore, when the blockage is noticed after some time, the small nozzle boreholes must be cleaned by boring these boreholes, or the cross section of the adjustment valves must be cleared. Apart from the interruption in the water supply during the repair and the long period of disrupted suspension for the water, as well as the involved work requiring certain technical knowledge, the nozzle wall is partially broken away or other problems arise while repairing such interruptions during operation. Due to the frequent enlargement of the nozzle borehole, a proportional supply of the chemical solutions within legally permitted limits cannot always be maintained, so that the dosing apparatus must be replaced several times.

Not least of all, for perfect functioning of the dosing device with regard to timing, there is the risk of undesired or unacceptable overdosing of chemical suspensions if a third party inadvertently or consciously opens the cross section of the whole adjustment valve and/or sets automatic pumping for strong pressure fluctuations, especially at stoppage times, that is, preferably at night, or, in contrast, supplies an uncommonly large water consumption to a progressively increasing suspension volume over the day.

The problem to be solved is to produce a device in which overdosing or underdosing of the chemical solutions to be supplied cannot occur, and furthermore to drastically reduce the risk of blockage, and in the case of blockage, to automatically perform cleaning or thorough rinsing of all connection paths by activating a combination pre-adjustment, fine-dosing, clearing, cleaning, rinsing, and control valve with spring tensile force.

The invention solves the problem in that a throttling cross section formed by a part of the valve spindle follows a throughput cross section that can be set by the valve spindle. This throttling cross section corresponds to the maximum permissible throughput and is independent of the axial position of the valve spindle when the adjustment spindle is set within the adjustment range of the valve spindle.

The particular advantage of the invention is that the diameter of the cylindrical section and the diameter of the pin on the valve spindle can be selected to be relatively large. The maximum throughput cross section is given by the annular gap between the outer diameter of the pin and the inner diameter of the recess. The actual throughput is determined by the intermediate

space between the valve cone and the valve seat. However, even when the valve has been turned completely open, only a limited amount of suspension can flow through the valve, since by turning the valve, the valve cone is merely moved away from the valve seat, but in every position of the valve cone, the pin remains in the cylindrical part of the recess and opens only the maximum permissible flow cross section.

The drawing shows an embodiment of the invention and parts of this embodiment.

Figure 1 shows a longitudinal section through the device with the spindle inserted into the device, partially broken away and shown in one position.

Figure 2 shows a longitudinal section corresponding to Figure 1, but in the closed position.

Figure 3 shows the valve spindle in the raised position, with the connection paths being thoroughly rinsed with full waterline pressure.

Figure 4 shows a section along line IV-IV of Figure 2.

In the embodiment shown in the drawing, a device 2 for supplying chemical solutions is inserted into a pressurized waterline 1. This device has a supply channel 3, which is connected to a fine-dosing apparatus or the like, for the chemical solutions or for the active pressurized water, which can be blocked by an adjustment valve 4. The adjustment valve according to the invention has fine-adjustment threads 5, which can be screwed into corresponding mating threads 6 in a threaded sleeve 7 guiding the valve spindle. The sleeve has threads 8, by means of which it is screwed into the device 2. Underneath the fine-adjustment threads 5, the adjustment valve has a valve cone 9, to which a pin 10 is attached. The pin 10 is surrounded by a cylindrical section 11 and a recess 12, whose top edge 13 forms the valve seat for the valve cone 9. The cylindrical section 11 of the recess 12 connecting to the valve seat 13 can have a relatively large diameter compared with the previously known nozzle channels or the valve throughput, so that the risk of blockage of this cylindrical part is significantly less than the latter. The cross-sectional area of the pin 10 is constant over at least the predominant part of its length and is smaller than the cross-sectional area of the cylindrical section 11 of the recess 12. The pin can be round or non-circular. It can have at least one sharp longitudinal edge. As shown in Figure 4, on two opposing sides of the pin 10, two areas 10' are milled, which define the maximum throughput cross section of the suspensions between the cylindrical section of the recess and the pin 10. The particular advantage of this embodiment of the invention is that, contaminants, e.g., rust particles, grains of sand, and other particles, introduced into the cylindrical part 11 of the recess 12 can be scraped off by the longitudinal edge of the inner wall of the cylindrical part 11 of the recess 12 when the valve 4 is turned close and can be forced out of the cylindrical part 11 into the water flow. A compression screw spring 14 is supported with one end on the projecting shoulder of the fine-adjustment threads 5 and with its other end on the inner front side 7' of the

threaded sleeve 7. The spring 14 aims to press the screwed-on valve spindle 4 inward in the direction against the cylindrical section 11 of the recess 12, so that even for a completely opened valve 4, the pin 10 cannot come out from this cylindrical part 11, which guarantees that the maximum desired or permissible amount of fluid suspension can no longer be supplied to the pressurized waterline 1. Another particular advantage of the spring 14 provided on the valve spindle 4 is that the valve spindle 4 can be raised so that the cylindrical part 11 of the recess 12 is completely opened up, so that contaminants possibly introduced into the cylindrical part 11 of the recess 12 can be rinsed out from this location. The pressurized water 1 then rinses the contaminants blocking the path for the active pressurized water from the pressurized waterline to or in the dosing container or vice versa and blocking the path for the suspension in or from the dosing container to the pressurized waterline with a forceful stream (full waterline pressure).

The fine-adjustment threads 5 are pressed by the spring force 14, that is, even for a completely screwed-out valve spindle 4, against the fine-adjustment mating threads 5 of the valve spindle 4. Therefore, when screwed in, the valve spindle 4 immediately reengages the threads 6. In this way, it is also achieved that, for example, after rinsing, the valve spindle 4 is not inadvertently screwed in again, nevertheless, only the maximum permissible amount of fluid suspension can enter into the waterline, since also in this position of the valve 4, the pin 10 remains in the cylindrical part 11 of the recess 12 and opens up only the permissible flow cross section. In the vicinity of the outer end of the valve spindle there is a collar 20. The valve spindle 4 can be set by a known toggle joint (not shown in the drawing). However, preferably the valve spindle 4 can be closed on the outside by a screw cap 16. The threaded sleeve 7 screwed into the device 2 has a threaded section 15 on its top end projecting out of the device, on which this screw cap 16 can be screwed. The particular advantage of this embodiment is that unauthorized persons cannot activate the valve spindle 4 or cannot identify the adjustment possibility without additional means, which could change the setting of the suspension volume of the chemical solutions. In the jacket of the screw cap 16 there are preferably two recesses. One recess fits a square 17 provided on the end of the valve spindle projecting from the threaded sleeve. The second recess has a circular cutout 18, whose diameter is larger than the outer diameter of the collar 20. A section 19, whose open width is smaller than the diameter of the collar 20, but larger than the spindle diameter 4, attaches to this cutout. With the recess fitting the square 17, the valve spindle can be screwed up or down. With the recesses 18 and 19, the valve spindle 4 can be raised against the effect of the spring 14.

In one embodiment of the invention, the pin 10 introduced into the cylindrical section 11 of the recess 12 has at least the same length as this section 11, but preferably the pin 10 is longer than the cylindrical section 11 of the recess 12, so that contaminants are pushed out from the cylindrical section 11 by the pin 10.

In Figure 2, the threaded spindle 4 is screwed in the supply channel 3 for the chemical suspensions and in the discharge channel for the active pressurized water so far that it completely blocks this channel; the conical section 9 of the valve spindle sits on the edge 13 of the borehole 12. The sharp longitudinal edges 10'' of the milled areas 10' of the pin 10 are used to scrape off possibly adhered contaminants to the inner wall of the borehole 11 when screwing in the valve spindle through the simultaneous circular motion.

In Figure 1, the position of the valve spindle is shown, in which suspensions, which are used to prevent hardwater deposits and to reduce corrosion and the like, are supplied into the pressurized waterline 1 or the active pressurized water is fed to the dosing container from the pressurized waterline. Through corresponding raising or lowering of the valve spindle 4, the desired dosing of the suspension can be set by changing the intermediate space between the valve cone 9 and its seat 13. The throughput cross sections created by the ground surfaces 10' between the cylindrical section 11 and the pin 10 also define the maximum throughput cross section for the suspension.

The valve spindle 4 also permits monitoring whether the cylindrical section 11 of the recess 12 is blocked. For this purpose, for flushing the valve channels, the spindle 4 is raised so far that its fine-adjustment threads 5 come out of the mating threads 6 in the threaded sleeve 7 until the fine-adjustment threads 5 contact the top edge of the mating threads 6. Then the screw cap 16 is set on the end of the valve spindle 4 so that the narrow part 19 of the recess comes to lie underneath the collar 20. The valve spindle 4 is raised by the screw cap 16 against the pressure of the spring 14 until the pin 10 comes out of the cylindrical section 11 (Figure 3), so that the strong water flow out of the pressurized waterline can flush contaminants out of the channels. However, if contaminants come into the cylindrical section 11 of the recess 12 and block it when it is flushed, then there is the possibility of completely removing the valve 4 by unscrewing the threaded sleeve 7. The cylindrical section 11 can then be exposed without having to disassemble the device into its many constituent parts.

By lowering the valve spindle 4 until the valve cone 9 sits on the valve seat 13, the line 3 supplying the active pressurized water to the dosing container and/or the line 3 supplying the chemical suspensions to the pressurized waterline 1 can be completely closed, so that phosphate suspensions or other water-soluble chemicals can be filled into an attached fine dosing apparatus or the like without disrupting the water supply.

By opening the valve spindle, the spring 14 presses the spindle back into its lower position, so that the pin 10 projects a small distance into the channel 11. If the valve spindle 4 is inadvertently not screwed back to the desired dosing level, it is nevertheless guaranteed that overdosing of the chemical suspensions into the pressurized waterline 1 cannot be performed, because only the maximum permissible throughput cross section is opened by the pin 10.

The valve can be constructed differently. All that is essential is that a throttling point in the valve, which does not change its throughput cross section for axial movement of the spindle, with the exception of flushing procedures, is arranged in line with the conical valve part, which is used for setting the throughput cross section. Instead of a cylindrical construction of the section following the valve seat, this section can also have a different construction, for example, it can have similar threading if it has a screw-like structure instead of a pin.

In addition to the described application example, the described construction of an adjustment valve is also suitable for connection lines between storage containers and dosing pumps or dosing pumps and pressurized waterlines or dosing pumps and feed water containers or also as a drip device on storage containers. Several sharp edges for scraping the cylindrical part of the throughput cross section can also be provided on the pin, e.g., teeth or else, for example, also a spiral.

In line systems, it can be desired to perform so-called pulsed dosing, e.g., with sodium silicate, chlorine, or phosphate. For this purpose, it can be advantageous when the spindle is held in its outer position, which otherwise is used for flushing of the valve, so that the throughput cross section is not reduced for the introduction of chemicals. For this purpose, the device can have a fixing device, with which the spindle is held in its outer position.

Through the safety device, by means of which the maximum throughput in connection with the valve can be set, the additional arrangement of secondary screens can be eliminated, which previously were used for limiting the throughput to the maximum permissible amount.

Main Claim

Device for supplying chemical solutions, in which at least one channel can be blocked by an adjustment valve with a valve cone, especially for dosing chemical suspensions into pressurized waterlines, characterized in that a throttling cross section (10, 11), which is formed by a part (10) of the valve spindle (4) and which corresponds to the maximum permissible throughput and which is independent of the axial position of the valve spindle (4) when the valve spindle (4) is located within the adjustment range, follows a throughput cross section (12, 13) that can be set by a valve spindle (4).

Subordinate Claims

1. Device according to the main claim, characterized in that a cylindrical part (11) of the recess (12) connects to a valve seat (12, 13) and that a pin (10), which enters into the cylindrical section (11) and whose cross-sectional surface is constant on the predominant part of its length and is smaller than the cross-sectional surface of the cylindrical section (11) of the recess, connects to the valve cone (9) of the valve spindle (4).

2. Device according to the main claim and subordinate Claim 1, characterized in that the pin (10) is non-circular.

3. Device according to the main claim, characterized in that the pin (10) has at least one sharp edge (10'').

4. Device according to the main claim, characterized in that the pin (10) has ground surfaces (10').

5. Device according to the main claim, characterized in that the pin (10) is provided with cleaning teeth.

6. Device according to the main claim, characterized in that the pin (10) has a cleaning spiral.

7. Device according to the main claim, characterized in that a spring (14), which attempts to press the valve spindle inward when the valve spindle (4) has been screwed on, is provided on the valve spindle (4).

8. Device according to the main claim and subordinate Claim 7, characterized in that the spring (14) is arranged between an inner end of a threaded sleeve (7) guiding the valve spindle (4) and carrying the fine-adjustment threads (5) and the fine-adjustment mating threads (6) of the valve spindle.

9. Device according to the main claim, characterized in that the valve spindle can be closed on the outside by a screw cap (16), preferably with a wrench.

10. Device according to the main claim, characterized in that recesses, one of which fits into a square (17) on the outer end of the valve spindle (4), are provided in the jacket of the screw cap (16).

11. Device according to the main claim, characterized in that recesses (18, 19), one of which is pear-shaped and is suitable for raising the valve spindle against the effect of the spring (14), are provided in the jacket of the screw cap.

12. Device according to the main claim, characterized in that the pin (10) inserted into the cylindrical section (11) of the recess (12) has at least the same length as this section (11).

13. Device according to the main claim, characterized in that projections or grooves, which are used for setting the screw cap when removing the spindle, are provided on the outer part of the spindle.

14. Device according to the main claim, characterized in that it has a fixing device, with which the spindle can be fixed in its outer position, the flushing position.

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Fig. 1

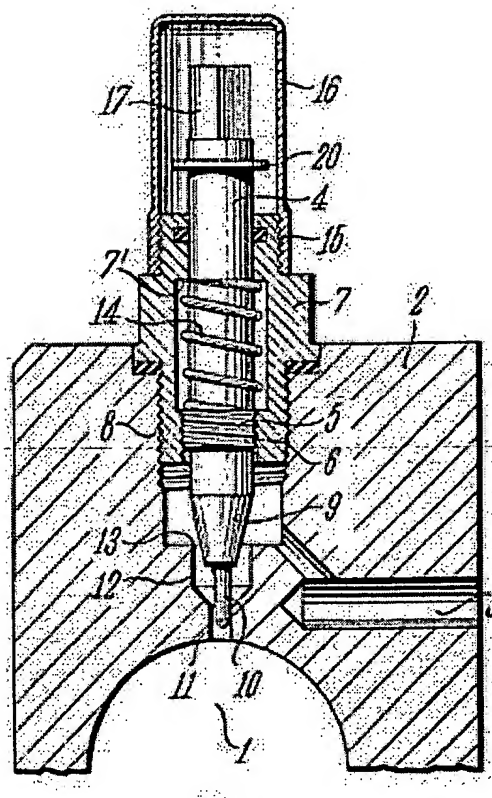

Fig. 2

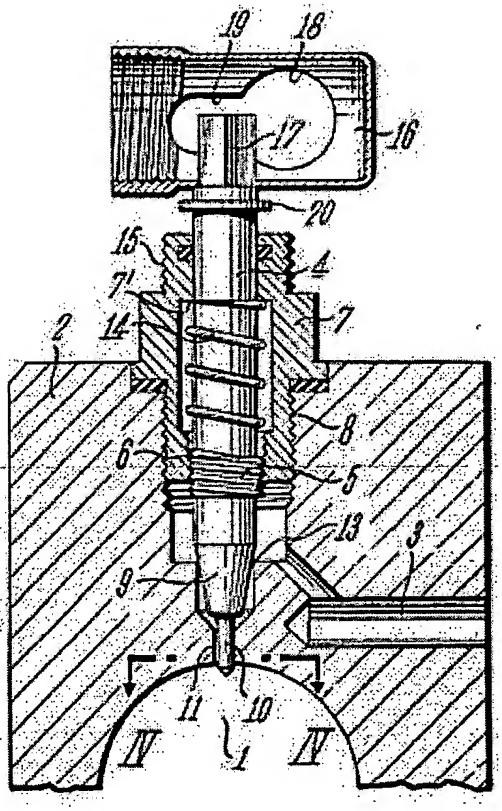

Fig. 3

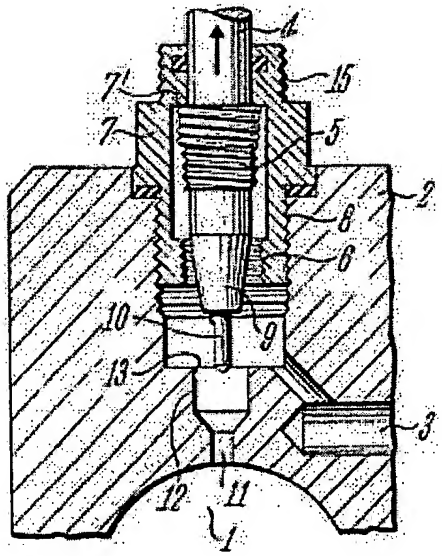

Fig. 4